COMMENTS TO THE FCC BPL NPRM

Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of

Notice Regarding Amendment of Part 15 Regarding New Requirements and Measurement Guidelines for Access Broadband over Power Line Systems	ET Docket No. 04-37

Comments by H. Ward Silver

Introduction

The current FCC proposal regarding the regulation of Broadband over Power Line systems, primarily "Access BPL" (hereafter 'BPL') attempts to address the concerns of existing HF spectrum users by modifications to Part 15 of the commission's rules. The proposed regulations are inadequate.

The proposed introduction of BPL technology is one of the first attempts to use both frequency-division and code-division technologies across the same HF spectrum on a wide scale. As such, it represents an important precedent for spectrum management as code-division technologies proliferate and demand access to the RF spectrum. For that reason, it is extremely important that the commission "get it right" the first time.

By proposing regulations that consist of weak arbitration rules and flawed methodologies, the commission will instead create large operational and technical uncertainties and costs for both those that propose to deploy BPL systems and existing, licensed spectrum users. The inevitable conflicts will have to be resolved in the courts at great expense and delay. This is especially vexing, since it is well within the

commission's capacity to develop rules based on sound science and good engineering practices.

There is no doubt that the delivery of broadband data services to the widest possible population is important to maintaining the United States' position as a world leader in technology and education. That is why the commission needs to be sure that the results of the Proposed Rule Making create a solid and well-designed foundation. The advantages and disadvantages of all available technologies must be weighed. The legitimate concerns of existing spectrum users must be addressed in a meaningful way. The final regulations must provide create a structure that reduces the risks for all through validated technical standards.

There is some confusion about the intent of the Proposed Rule Making. To quote the American Power Association from their comment filed 30 April 2004, "The key purposes of this proceeding are to promote the development and deployment of this technology, not to hamper them. The Commission should not adopt any rules that would inadvertently counter its stated goal of promoting BPL deployment." Not so. The commission has been charged with establishing technical and administrative standards for the deployment of broadband technology in general. As such, the commission must consider many factors to develop the technical standards that channel development in directions that benefit all citizens while avoiding unnecessary damage to existing communication systems. The commission's goal is to promote broadband deployment, not BPL specifically.

A hasty Rule Making today risks crippling existing communications systems and wasting investment in broadband data delivery systems. Given the clear and obvious

signs that the proposed regulations are deeply flawed, there is no good reason why the commission should not return to the standards development process until a suitable package is ready. It is reckless to do otherwise.

I am a degreed Electrical Engineer with 25 years of experience in industry, broadcasting, and as an educator. I have held the General Radiotelephone license and Amateur Extra Class license (NØAX) for 28 years. A large portion of my professional experience has been spent troubleshooting. I have seen substantial sums of money and time wasted when development groups ignored or did not respect sound science and good engineering practices. With the stakes so high in the case of BPL - both for the existing HF users and for utility investors and ratepayers - I am deeply concerned at the commission's disregard of what a practicing engineer would consider obvious "red flags." There are plenty of recent examples of the results of ignoring these indicators, none of them good. I hope we can avoid repeating these mistakes by putting on our "engineering hats" when it is still early enough in the process to do so.

Specific Responses to the Notice of Proposed Rule Making

1. The Proposed Part 15 Regulations are Unsuitable for BPL Systems

With regard to application to BPL systems, Part 15 regulations are flawed in three fundamental ways as follows:

- Part 15 regulations were based on the expected behavior of localized devices, not regional systems covering many square miles. BPL systems will incorporate hundreds, if not thousands of radiating devices, none of which will have an interfering signature sufficiently unique to allow a source of interference to be efficiently identified. The assumption that to eliminate interference an interfering device can be isolated and disabled is simply not true for BPL systems.
- BPL will radiate continuously, from many sources, and on many different frequencies as part of its normal operation. This renders useless the reasonable interference accommodation strategies on the part of existing users. The original Part 15 rules are based on the "many users, one interference source" model. BPL devices are expected to greatly outnumber existing spectrum users, invalidating the assumed model and thus making the regulations unfit for this application.
- Part 15 places the responsibility for managing interference squarely in the domain of the unlicensed user. In the case of BPL, the end user has no control over the selection of technology and so can not be reasonably expected to be sufficiently educated to accept that responsibility. Regulations that make unreasonable assumptions about the capabilities of regulated parties are susceptible to legal challenges and are frequently overturned.

In short, Part 15 regulations are completely unsuitable to regulate distributed radiating systems, such as BPL. They have proved insufficient to deal with the proliferation of even single-device radiation sources. Using Part 15 regulations as the administrative basis for BPL deployment is doomed to failure.

2. The Proposed Part 15 Methodology is Insufficient

The NTIA's BPL Phase 1 Report (NTIA Report 04-413) clearly shows that the methodologies and radiation limits of Part 15 regulations are inadequate to address the large-scale deployment of systems such as BPL that are known to radiate significant amounts of energy. Quoting from the Executive Summary of that report, "Critical review of the assumptions underlying these analyses revealed that application of existing Part 15 compliance measurement procedures for BPL systems results in a significant underestimation of peak field strength. Underestimation of the actual peak field strength is the leading contributor to high interference risks. As applied in current practice to BPL systems, Part 15 measurement guidelines do not address unique physical and electromagnetic characteristics of BPL radiated emissions."

The commission needs to completely rework the Part 15 methodologies and radiated level limits to be applicable to BPL systems. The NTIA report is clear - Part 15 regulations do not work for BPL, regardless of how many times BPL proponents say that they do.

3. Proposed Methods of Identifying and Resolving Interference Complaints is Inadequate

Requiring BPL systems to incorporate capabilities to mitigate or avoid harmful interference is a step in the right direction. The commission must now complete the regulations and define what is required of the system developers in order to comply with the rule. To create a rule with no clear means of determining compliance creates

unacceptable risks to both the BPL system developers and to parties to whom they might cause interference. The end result will be to throw the decision into the courts where the costs and delays can be extreme. By not developing a set of rules with the necessary metrics for compliance, the commission will be derelict in its duty to promote efficient and effective use of technology.

As an example of where this process will lead, the field trials of BPL in Raleigh, NC by Progress Energy Corporation have already resulted in significant disagreement over interference issues. This occurred even with a highly trained system installation staff and an extremely limited deployment. Without adequate measurement methods and compliance metrics, the risks for both the BPL system developers and the existing spectrum users are simply too high to proceed.

In addition, field trials show that even a BPL system administrator highly motivated to avoid interference will have a difficult time doing so because of the operational characteristics of the technology and the distributed nature of the system. It is difficult to identify the source of the interference initially and, once identified, removing the interference requires several adjustments by trained personnel. Without a clear requirement from the commission, it is unlikely that efficient methods for interference mitigation will be incorporated into the system. This is an unacceptable risk to existing spectrum users.

The commission proposes to make public information about system configuration and deployment to aid in the identification of interference sources. This runs counter to both privacy requirements and exposes the system to unnecessary risk of intrusion. In addition, it is not clear how either the system administrator or the party suffering

interference are to make use of this information. This portion of the proposal is simply an unworkable morass of regulation that has no practical chance of providing the intended result.

4. The Proposed Rule Making is Incomplete

In addition to the flaws in the Proposed Rule Making, there are several critical areas that remain unaddressed. The commission must address these issues before issuing a final set of regulations.

- International Treaty Violation: By nature, HF signals propagate worldwide, depending on solar and ionospheric conditions. The treaties covering HF spectrum allocation do not allow one nation to arbitrarily introduce interfering signals that can affect its neighbors. Surely the commission does not intend to ignore the potential impact to international HF operations, especially critical aviation services.
- Susceptibility of BPL Equipment to High Field-Strength Signals: Along with the expected interference from BPL systems, equipment tested to date shows a high degree of sensitivity to strong local signals, to the point of inoperability. Although the commission has resisted specifying susceptibility levels in the past, given the nature of BPL systems and the inabilities of the BPL user or transmitting party to identify the means or methods by which the BPL equipment is affected, it is incumbent on the commission to develop standards that will create the maximum likelihood of reasonable coexistence between local transmitters and BPL systems.

- Spurious Radiation by BPL Systems: Given that BPL systems operates with dozens of simultaneous carriers on different frequencies, the probability is high for BPL systems to generate spurious signals far from their normal operating spectrum. Second and fourth-order intermodulation products could extend well into the VHF range, affecting public safety, military, aviation navaids, television, and FM broadcast services. Given that the existing power grid, rife with defective and corroded connections, is the physical network over which BPL signals will propagate, such spurious products should be expected as a matter of course. One would expect that the regulations would deal with these spurious signals, but the Proposed Rule Making contains no regulations that would establish compliance limits in this regard.
- Mobile Users: No provision is made for operators of mobile stations, including aviation, to seek relief from interference. Given the wide area over which BPL systems are proposed, a mobile operator will likely experience interference over a wide area, effectively continuous. This will be a particular problem for airborne operators, as noted in the NTIA report referenced earlier.

5. The Proposed Rule Making Violates Good Faith Requirements

Recent Federal judicial rulings clearly require federal agencies to establish regulations in good faith, based on best practices and sound science. As independent testing and review of the Proposed Rule Making clearly show, many of the assumptions regarding the ability of BPL and existing users to efficiently share spectrum fail in that regard. As such, should the commission continue to pursue BPL deployment under the

Proposed Rule Making, it would be a clear indication to the courts that the commissioners did not intend to satisfy those requirements in good faith. This exposes all parties - the commission, BPL system developers, and existing users - to judicial remedies that are likely to consume a great deal of time and resources in an inefficient resolution process.

As an example of such a ruling, I suggest that legal counsel to the commission review the 1996 ruling of Federal judge William Dwyer on an analogous case involving the State of Idaho and the EPA regarding the development of appropriate technical standards for water pollution. The wording should very clearly translate to the current issue of interference. "More than a year ago, Dwyer told the EPA and the state to set a schedule for developing pollution standards for the degraded water bodies. Known as Total Maximum Daily Loads (TMDLs), these standards determine how much pollution can be allowed in a river on a given day without causing further damage. Environmentalists see them as a way to protect fish and wildlife habitat, while industry groups worry they will stymie future development in many watersheds.

In September, the EPA submitted a schedule that would have taken 25 years to implement and did not include all 962 water bodies. Dwyer found the schedule to be "arbitrary and capricious, an abuse of discretion, and contrary to law ..." He gave the agency six months to come up with a new schedule, and suggested that five years should be plenty of time to develop standards." (High Country News; Dec 9, 1996, "Judge tells EPA to hurry up in Idaho", by John Rosapepe)

In this case, at issue was a schedule for standards, but it should be clear that whatever the regulatory output, it is not acceptable to promulgate regulations that are

clearly inappropriate and unsuitable for the task at hand. Continuing to rely on Part 15 regulations is, at best, poor practice and leaves the commission liable to legal challenge. A continued reliance by the commission on methodology and assumptions that are demonstrably insufficient at the time of adoption constitutes what the courts have repeatedly considered "willful disregard" for acceptable standards. It surprises me that the commission continues to promote such clearly flawed proposals in the face of repeated and consistent court challenges to similar practices.

SUMMARY

The Proposed Rule Making contains deep flaws that will effectively prevent an orderly deployment of BPL technology and puts at risk the many communications systems found in the HF spectrum. Technically, independent review finds the proposed regulations to be completely inadequate for measurement, compliance, or enforcement. Administratively, guidance for BPL system developers and existing users in the matter of interference mitigation, detection, and resolution is either non-existant or unworkable.

It should be clear to the commission that to pursue this Proposed Rule Making without significant and meaningful modification will result in unacceptable levels of risk to all affected parties and a wasteful expenditure of resources in the judicial system.

I urge the commission to reopen the standards development process for BPL deployment. Take into account the critique offered by independent evaluations and reviews. Re-evaluate competing options to BPL that may be a more effective means of

broadband delivery. Do not miss this opportunity to set the course of broadband deployment on a firm foundation worthy of the name.

Respectfully submitted,

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